



October 2, 2001
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Matls. I.M. 565

STEEL FABRICATION SHOP DOCUMENTATION

SHOP INSPECTION DOCUMENTATION

A copy of material acceptance reports, such as Mill Test Certifications and test reports of material sampled and submitted to the Department of Transportation Materials Laboratory shall be retained in the DOT inspector records. Records shall be kept of the various phases of shop inspection. Such records shall include the inspection date and the initials of the individual conducting the inspection.

I. Recording Heat Numbers, Grades of Steel and Measurements

A. Heat numbers and grades of steel

Heat numbers found on main members of steel shall be recorded and a checkmark shall be placed by the recorded heat number after acceptability has been verified with the Mill Test Certifications. Grades of steel shall be recorded with the heat number. When plate testing frequency is required rather than heat testing, the slab or serial number shall be recorded with the heat number.

Heat numbers recorded by the Quality Assurance Inspector shall be checked with the fabricator's certified cutting list when that document becomes available.

B. Recording measurements

After main member structural steel has been measured in accordance with I.M. 562, the measurements shall be recorded in the following manner:

1. Nominal thickness and width
2. Actual measured thickness and width when these dimensions are less than nominal. If measurements are nominal or above, a check mark may be placed in the Actual Measurement column.
3. Difference between nominal and actual measurement, if difference is outside tolerance.

C. Weight computation of rolled beams

The **weight (mass)** of rolled beams shall be computed by the method outlined in I.M. 562 and the measurements shall be recorded as follows:

1. Theoretical combined average thickness of the web and flanges
 2. Measured combined average thickness of the web and flanges (web t + flange t).
 3. Difference
 4. Percent difference (Maximum - 2.5%)
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II. Nondestructive Testing (Magnetic Particle and Radiographs)

The following information shall be retained in the shop inspector records:

1. A copy of the document received from the DOT Laboratory accepting the operator's qualifications.
2. A date check on last eye examination (one year limit)
3. A copy of the inspection record furnished by the NDT operator.
4. A record of monitor inspection of the magnetic particle inspection conducted by the qualified operator and the dates, piece numbers and the locations tested.
5. A record of radiograph locations, film interpretation by the shop inspector and the DOT Laboratory approval number.

III. Welding

The inspector shall record the monitoring of welding inspection to ensure that approved welding procedures are being applied and the welding parameters are within the limitations of variables of American Welding Society (AWS) Code.

IV. Camber and Blocking Inspection in Laydown

Both camber and blocking diagrams shall be tabulated in such a manner that all girders and/or beams in a line will be arranged as they appear in laydown and will include the following information:

1. The calculated or given camber offset dimensions at bearing points, midpoints, and field splice points
2. The actual camber offset readings
3. The difference between the calculated or given camber offset readings and the actual readings
4. Blocking diagram tabulation shall include the blocking offset dimensions at bearing points, midpoints, and field splice points. Any deviations shall be recorded.

The allowable tolerances are shown in I.M. 564. The disposition of the camber and/or blocking of each line inspected shall be recorded.

V. Laydown Inspection of Detail Locations

The following dimensional locations shall be checked and recorded:

1. End of member at abutments
 2. Bearing points
 3. Stiffeners
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4. Gusset plates
5. Splices (field and shop)
6. Cover plate ends
7. Drain connecting hole locations.

The location of the above details shall be recorded and tabulated on an accumulated dimensional basis starting with a zero reading at the abutment bearing point or hinge bearing point and continuing to the opposite end of the line.

Both the computed dimensional locations and the actual dimensional locations of the above details shall be recorded. When the dimensional location of the various items is found to be within tolerance of with the computed dimensions, it shall be noted with a check mark on the check off sheet.

When differences exist between the computed dimension and the actual dimension, the difference between the readings shall be recorded along with a plus or minus sign or with an arrow which shows if the difference is toward or away from the zero reading end.

VI. Painting, Final Inspection and Stamping

Record dates of paint inspection and average paint thickness of member inspected. After the final inspection, the inspector shall place a stamp on girders and/or rolled beams, indicating release for shipment. Piece numbers of members stamped shall be recorded.

VII. Record of Discrepancies

All discrepancies found which are outside specification limits, and the corrections of which are not included in the specifications, shall be recorded with any communications about such discrepancies and their subsequent corrections.

The discrepancies noted above refer to any area of inspection including welding, materials, shop or design.

VIII. Record Keeping Check List

The following is a list of documents that should become part of the Quality Assurance inspector permanent files during the progression of the fabrication of the structure:

1. Design drawings
 2. Proposal
 3. Applicable special provisions
 4. Approved shop drawings including welding procedures
 5. Standard Specifications
 6. Current approved electrode list
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7. Prefabrication meeting notes
 8. List of qualified welding operators, welders and tack welders (Record should show the type welding, position and expiration date.)
 9. Approval of QC Certified Welding Inspector Documentation and approval of NDT Personnel by the Ames Materials Office. (This record should include the operator's latest vision test. one year limit.)
 10. 3 copies of Mill Test Certifications of the structural steel.
 11. Producer certifications for shear studs and miscellaneous items.
 12. A copy of fasteners certifications
 13. Material test reports from Ames Laboratory, such as radiographs, paint, casting, fasteners, etc.
 14. A copy of material identification Form #193, which was submitted with samples, sent to Ames Laboratory for testing.
 15. Correspondence pertaining to fabrication of the structure
 16. Cutting list from the fabricator certifying the heat number locations
 17. NDT inspection records from certified personnel. (Information required on NDT reports outlined in I.M. 561).
 18. Tensioning bolts according to Turn-of-Nut

In addition to the above records, the following records should be maintained when Fracture Critical Members are included:

19. A copy of Weld Procedure Test observed by the Quality Assurance Inspector.
 20. A copy of Welders, Welding Operators and Tackers who are approved for Fracture Critical Welding and a similar record of those approved for non-fracture critical welding.
 21. A copy of manufacturer recommended storage methods of welding materials.
 22. A copy of manufacturer test results of the electrodes to be used.
 23. A copy of Ultra Sonic test results conducted by the fabricator.
 24. A copy of Ultra Sonic test results conducted by the contracting authority (DOT), when required for the project.
 25. A copy of test results when other NDT testing is required, such as Liquid Penetrant.
 26. A copy of critical and non-critical repair procedures.
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27. Record of QC and QA inspector acknowledgements of needed repairs and a copy of sign off record after repairs were completed.
28. A copy of QC-1 Certified Welding Inspector Document.
29. Documentation of approved stud welder operator qualification.

IX. Final Inspection Report

The information listed below shall be included in the final inspection report. Form #258, Department of Transportation Miscellaneous Materials shall be used for the title block.

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| a. laboratory | i. county |
| b. description of structure | j. project number |
| c. laboratory number | k. design number |
| d. date reported | l. contract number |
| e. fabricator | m. contractor |
| f. source | n. subcontractor |
| g. design pay weight | o. letting date |
| h. inspector name | p. final shipping date |

The following statement shall be included in the final fabrication report:

The material inspection of this bridge has been completed and, where checked, materials and fabricating procedures are found to comply with current Department of Transportation Standard Specifications.

Supplemental Specifications and design drawings. This report pertains to materials, procedures and the final design inspection. The design inspection includes a check of the camber, blocking, final fabricated dimensions, location of detail items and the general appearance. All items checked were found to comply with the approved drawings and design drawings unless otherwise noted later in this report.

List the grade of steel used in the structure and include the following statement:

The Mill Test Certifications were checked and found to comply with the applicable specifications for the grade of steel specified. The heat numbers found corresponded with the Mill Test Certifications. All heat numbers that were found and checked are listed below".

A. Reporting of heat numbers

The following information shall be included when correlating heat numbers of steel for main members to their respective locations in the girder or rolled beam assemblies:

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- a. rolled beam or girder number
 - b. item (web, flange, cover plate)
 - c. description (dimensions)
 - d. heat numbers (and slab or serial numbers when required)
 - e. other main members (material shall be listed with dimensions and heat numbers)

B. Other materials

The final fabrication report shall include the basis of acceptance of the materials listed below and on the following pages.

1. Hardware

List the Iowa DOT Laboratory number under which the hardware items were approved. When hardware is supplied from stock, list individual sample dates and Iowa DOT Laboratory approval number.

2. Castings

The following information shall be included:

- a. producer
- b. pieces
- c. casting numbers and grades (when available)
- d. inspection office
- e. Department of Transportation Laboratory approval numbers (when available)

3. Galvanizing

The following information shall be included in the final report when galvanizing inspection is conducted at the fabricating plant:

- a. galvanizing company
- b. inspector
- c. description of material
- d. approved Laboratory numbers when applicable

NOTE: When galvanizing inspection will be required in the field, a statement informing field personnel shall be included in the final report.

4. Shear studs

A statement providing the following information concerning shear stud inspection shall be included in the final report:

- a. producer of the shear studs
- b. acknowledgement of receipt of certification in compliance with the specifications
- c. verification that inspection of welding, spacing, and workmanship was conducted

5. Painting

The final report shall include a statement with the following information pertaining to paint inspection:

- a. paint manufacturer
- b. product name
- c. lot or batch number

C. General Information

A section of general information shall be included in the final report covering the items listed below and on the following page or any other information that is pertinent to the bridge fabrication inspection:

1. Blast cleaning

A general statement shall be included noting the method of blast cleaning and the specifications required.

2. Welding and welding procedures

A statement shall be included in the final report noting that only qualified welders, operators and tackers did the welding or tacking using approved procedures with approved electrodes or wire-flux combinations.

3. Non-destructive testing

A statement shall be included in the final report noting the extent of non-destructive testing conducted in accordance with specification requirements.

4. Miscellaneous items

A statement shall be included in the final report noting unusual items not previously covered such as the inspection of canvas, neoprene pads, special expansion assemblies, drains, etc.

D. Design inspection

The final report shall include a description of the items checked during laydown inspection, and what items remained to be inspected prior to final approval and shipment.

E. Discrepancies

Note: All discrepancies found during material, welding, design and shop inspection. Include a statement of corrective action taken and the personnel authorizing such action.